4.2.5. Tractor Crossings

Tractor crossings can deliver sediment to watercourses if they are not removed or stabilized.

- ***Has the tractor crossing been removed prior to the winter period?*** Unless the crossing is permanent, it must be removed from the watercourse before November 15th, or otherwise specified in the THP.

- ***If the crossing is removed, has the fill been excavated to form a channel that is as close as feasible to the natural watercourse grade and orientation?*** Has the use of the tractor crossing caused extensive bank or channel damage? Has the excavated material or bare soil been stabilized to prevent slumping and to minimize soil erosion?

- ***Have the approaches to the skid crossing been disconnected and stabilized to prevent the delivery of sediment to the watercourse?*** It is virtually impossible to disconnect all of the skid trail drainage from the watercourse. However, the length of skid trail draining to the stream should be kept at a minimum.

4.2.6. Tractor Operations

Tractor operations can impact water quality if they occur close to watercourses and/or on steep slopes.

- ***Did tractor operations occur on slopes steeper than those allowed by the Forest Practice Rules, and which pose a threat to water quality?*** For example, did tractor operations occur on slopes greater than 50% that lead without flattening to a watercourse or lake?

- ***Make sure that waterbreaks are put in at the correct spacing on skid trails and are properly constructed*** (Figure 19)***.*** Waterbreak spacing for skid trails is based on the steepness of the skid trail and the estimated erosion hazard rating. For proper waterbreak spacing on skid trails see Table 2. Site-specific recommendations on waterbreak spacing may also be listed in Section II, Item 21 of the THP.

4.2.7. Site Preparation

- ***Is concentrated water from roads, landings, skid trails, and firebreaks, drained onto site preparation areas?*** If so, make sure that energy dissipators are placed below the outlet of the waterbreak.

- ***If contour ripping is used, make sure that the slope is ripped perpendicular to the fall line (i.e., the downhill direction) of the slope.***

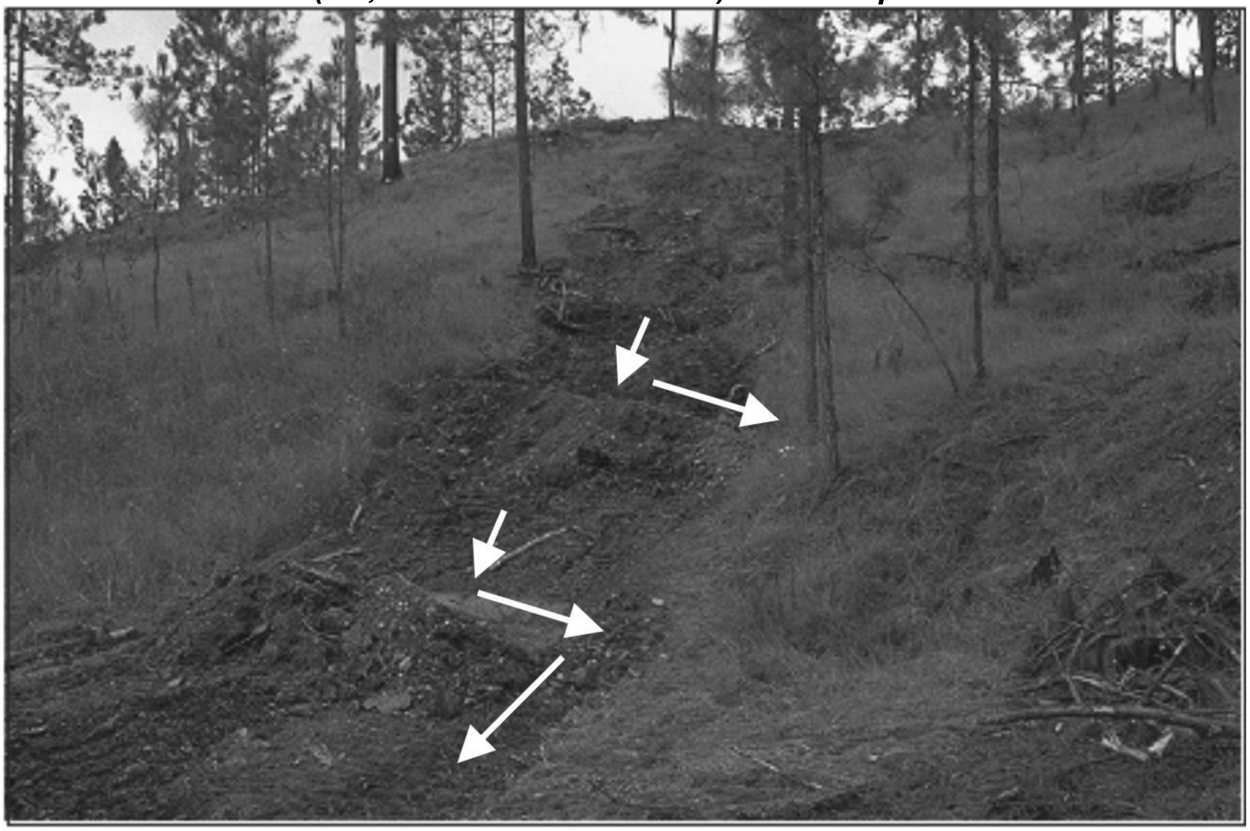


Figure 19. Waterbars on a skid trail. Arrows indicate the flow of water. The waterbar at the bottom of the picture was not constructed properly and as a result will reroute runoff onto the skid trail (Keller and Sherar, 2003).

4.3. Forensic Monitoring:

Forensic monitoring is generally required for Waiver categories 3 and 4, and for Notice of Emergency Timber Operations related to fire salvage (Figure 9). Forensic monitoring determines whether significant pollution is being generated by hillslope features such as roads, landings, skid trails, watercourse crossings, and unstable areas. In short, forensic monitoring answers the question, “Did our implemented management measures hold up well during winter storms?”

Forensic monitoring employs visual field detection techniques to detect significant pollution caused by failed management measures, failure to implement necessary measures, problems related to legacy timber activities, non-timber related land disturbances and natural sediment sources. Forensic monitoring should include photo-point monitoring to document pollution sources. Forensic monitoring is typically applied at the hillslope and watershed scale, and is conducted by the discharger.

If forensic monitoring is required (Figure 9), it must be conducted at least two times during each winter period that the THP is enrolled in the Waiver once timber operations have begun. Forensic monitoring will take place:

- Once, during or within 12 hours following a 24-hour storm total of at least 2 inches (of rainfall) and after 5 inches (of total precipitation) has accumulated after November 15 and before April 1.
- Once, during or within 12 hours following a 24-hour storm total of at least 2 inches (of rainfall) and after 15 inches (of total precipitation) has accumulated after November 15 and before April 1.
- If a noticeable significant discharge of sediment is observed at any time in any Class I or Class II watercourse. Photo-point monitoring shall be conducted when such discharge is the result of failed water quality protection measure(s) or lack of implementation of such measure(s).

Figure 20 demonstrates the timelines for forensic monitoring as related to storm precipitation and accumulated precipitation. Inspections that cannot be conducted during or within 12 hours of such a storm event (due to worker safety, access, or other uncontrollable factors) shall be conducted as soon as possible thereafter and will be noted in the annual report.

Landowners must determine 24-hour rainfall totals and accumulated precipitation as of November 15th in order to determine when to do forensic monitoring. Regional 24-hour rainfall data can be accessed from the California Data Exchange Center (CDEC) (http://cdec.water.ca.gov/precip_maps/)(Figure 24). To find the closest precipitation gaging stations to your THP area use the following link (http://cdec.water.ca.gov/cgi-progs/mapper).

It is critical to do forensic monitoring during the storm event, or shortly after the storm event (i.e., within 12 hours). This is because significant pollution can often occur relatively early in a storm event, and can be missed if monitoring is done too long after the storm ends. If forensic monitoring can't be done during this critical time frame, it is easier to determine if significant pollution has taken place when forensic inspections are done at hillslope scale. This is because evidence of significant pollution (i.e., rills; gullies; landslides) can usually be observed in the field. Forensic monitoring at the watershed scale should not be done if the monitoring time frame is missed.

Hillslope scale forensic monitoring should focus in the following THP areas:

1. Timber harvest activities within or near unstable areas;
2. Constructed or re-constructed Class I, II, or Class IV (with domestic use) crossings;
3. Class I, II, or IV (with domestic use) watercourse and lake protection zones where ground based equipment operations have occurred (i.e., tractor crossings);

4. Road construction or reconstruction within 500 feet of a Class I, II, or IV (with domestic use) watercourse;
5. Landing construction or re-construction within Class I, II, or IV (with domestic use) watercourses;
6. Ground-based equipment on areas classified as high or extreme erosion hazard rating that have the potential to impact water quality;
7. Ground-based equipment on slopes greater than 65% or slopes over 50% classified as high or extreme erosion hazard rating;
8. Areas where “In-lieu” or “alternative” practices that have the potential to impact water quality.

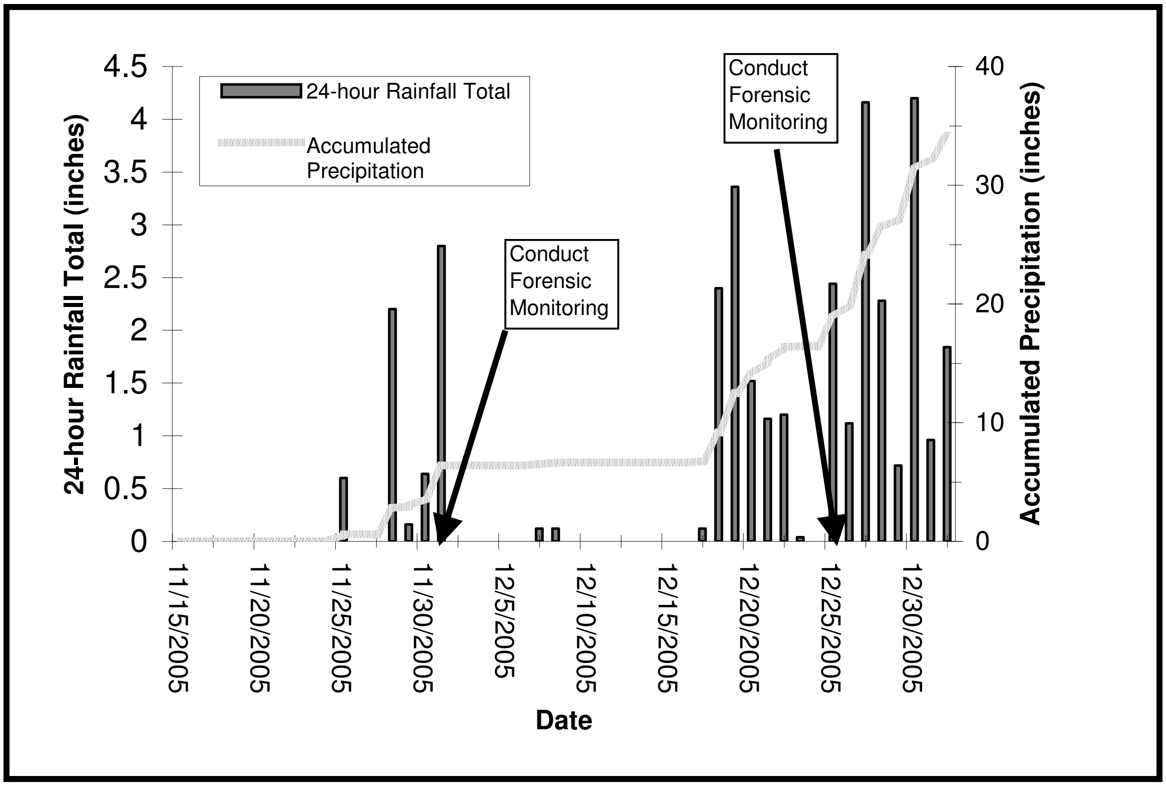


Figure 20. A graph detailing the timeline for forensic monitoring. The 24-hour rainfall totals and accumulated precipitation are for the Brandy Creek raingage. Arrows indicate dates of forensic monitoring.

When conducting forensic monitoring in these areas, look for erosion features (rills; gullies; landslides) that transport sediment to a watercourse. If failed management measures cause, or may cause, 10 or more cubic yards of sediment delivery to a watercourse, then forensic photo-point monitoring is required. Common erosion features associated with timber harvest activities after large storms may include:

- **Landsliding associated with timber harvest activity.** Landslides can be initiated by road drainage or skid trail drainage (Figure 21), or by perched fill material or sidecast. Report all landsliding associated with timber harvest activities.

Hillslope scale forensic monitoring should focus in the following THP areas:

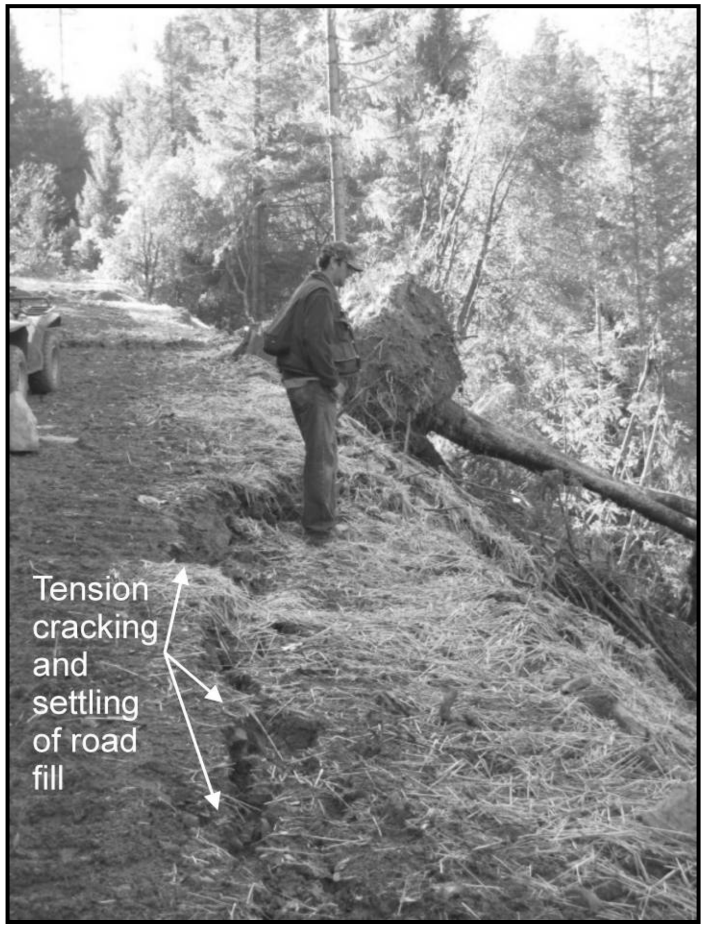
1. Timber harvest activities within or near unstable areas;
2. Constructed or re-constructed Class I, II, or Class IV (with domestic use) crossings;
3. Class I, II, or IV (with domestic use) watercourse and lake protection zones where ground based equipment operations have occurred (i.e., tractor crossings);
4. Road construction or reconstruction within 500 feet of a Class I, II, or IV (with domestic use) watercourse;
5. Landing construction or re-construction within Class I, II, or IV (with domestic use) watercourses;
6. Ground-based equipment on areas classified as high or extreme erosion hazard rating that have the potential to impact water quality;
7. Ground-based equipment on slopes greater than 65% or slopes over 50% classified as high or extreme erosion hazard rating;

Areas where “In-lieu” or “alternative” practices that have the potential to impact water quality.

Figure 21. Landslide caused by diverted skid trail runoff.

- **Tension cracking or settling on road fill or sidecast.** Tension cracks on road fill or sidecast indicates that landsliding may occur (Figure 22). Report tension cracking of road fills and sidecast if the delivery to a watercourse is likely.

Figure 22. Picture shows tension cracks on the outside edge of the road fill. In addition, the fill material has settled approximately one foot. Tension cracks and road settling are indicators that the fill material is unstable. If the hillslope is steep enough unstable fill material may result in landsliding.



- **Erosion voids at road crossings.** Erosion voids may occur near the inlet or outlet of the crossing (Figure 23). In some cases where the inlet of the culvert becomes plugged, runoff overtops the crossing and most of the fill material above the outlet of the culvert can be washed away.

Figure 23. An erosion void near the outlet of a road crossing (from http://www.tcrcd.net/images/sftr_erosion2.jpg).

- **Extensive rilling or gullying of road surfaces, road fills, and landings that deliver or may directly to a watercourse** (Figure 24). Water quality impacts can occur when rills or gullies develop on the approaches to a road-stream crossing or the fill material at a road-stream crossing.

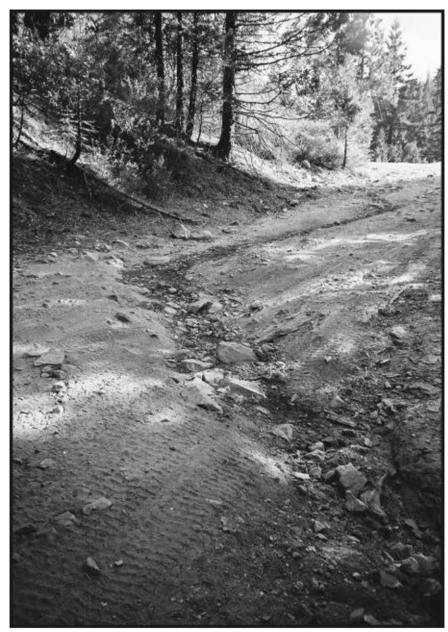


Figure 24. An example of rilling on a road surface. This might be considered significant pollution if it delivered directly to a watercourse. Erosion impacts can addressed by correcting road drainage.

- **Gullies on or below poorly drained roads or skid trails that deliver or may deliver directly to a watercourse**. This is typically caused by insufficient drainage on the road or skid trail (Figure 28).